Chapter 12
Green IoT and NBIoT

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ABSTRACT

This chapter illustrates that there are many challenging problems in the modern society such as environment pollution, radiation pollution, high demand, and low supply of energy. Such issues need modern solutions to tackle them. In this context, green internet of things (IoT) solutions have come up with flying colors. As there is a constant need of the energy by the interconnected IoT devices to perceive, fetch, and transmit the real-time information, the energy demands remain high. Green IoT is an emerging concept to meet this problem by framing the energy-efficient policies so as to provide a simpler yet better solution to enhance the quality of the current practices. In this chapter, different practical aspects of green IoT and narrowband IoT (NBIoT) deployment have been presented. NBIoT narrowband signals are used in low data rates are transmitted and have a widerange of reception because narrow filters cancel out unwanted wideband noise. NBIoT has several advantages over LTE-M due to lower device cost, longer battery life and extended coverage. Finally, some future research directions have been addressed.

INTRODUCTION

The phrase "It's a small world" is clearly justified with IoT as billions of devices are connected through networks. We can communicate anything, anywhere and anytime. IoT has put a high impact on professional as well as private lives. For example, the Prime minister of India Mr Narendra Modi confessed: "Google has spoilt my habit of reading" (Deccan Chronicle, 2019). Sharma, L et al (2017) presented that the machines are smarter enough to fetch, process and transmit data efficiently and the various sectors are also becoming a part of it like health care, travelling, shopping through real-time applications but IoT has certain cons too. Since the world is mutually interconnected, thus to fetch the data huge data storage is required and its processing demands surplus energy. At the same time, very large channels are required to transmit the processed data. This further burdens the already affected energy depleted society and the environment. To achieve sustainable development, Green IoT has come to the rescue. It has become a prominent choice to decrease carbon emission as well as to lower the power consumption demand.

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It focuses on reducing CO_2 emission and e-waste disposals by making the best use of technologies for sharing the infrastructure of data centre and looking for new resources. Narrowband IoT (NBIoT) is one of the communication techniques of the IoTs available for deployment. Its popular features are its low power wide area (LPWA) characteristics. NBIoT has the potential to reduce the power and bandwidth required for large IoT projects like smart grid, smart buildings.

The "Internet" can be defined as a globally connected network system that uses communication protocols (i.e., TCP /IP model) to transmit data through various types of media. The Internet is a network of global exchanges including private, public, academic and government networks connected by guided, wireless and fibre-optic technologies. "Things" in IoT, refer to any device that has its own IP address and can send or receive data using a network. So, IoT is the network of physical things that can share information.

Figure 1. IoT Architectural Layer

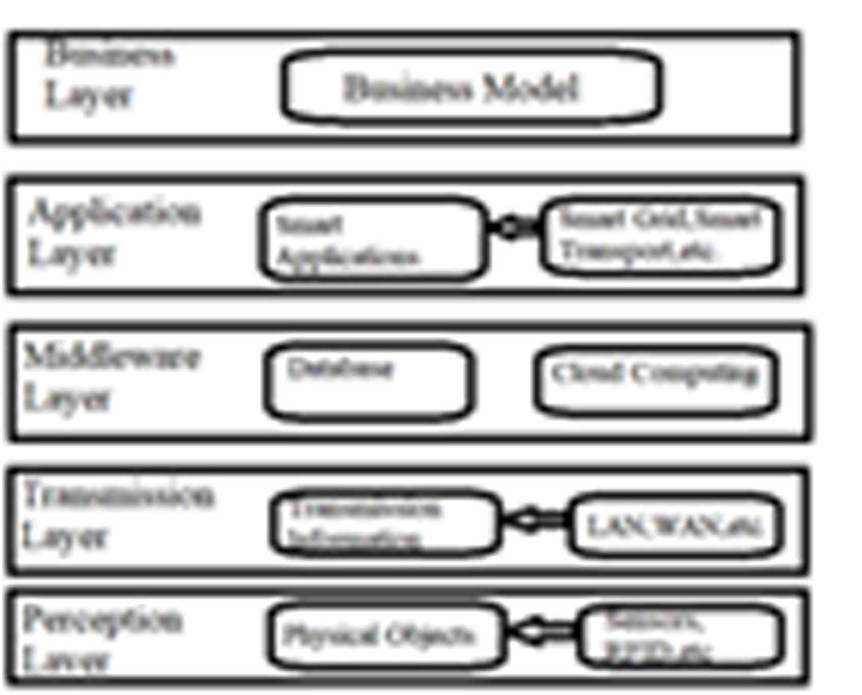

Figure 1 briefly explains the layers of IoT architecture. X. Liu et al (2016) presented the initial layer is Perception Layer which is used for data gathering through physical objects like sensors and actuators. It further involves encryption, key agreement and sensor data protection. Transmission Layer is also known as Network layer and is used for data transmission. It includes encryption mechanisms and identity authentication. Middleware Layer process the transmitted information using the decision units, like cloud computing. Application Layer comprises of smart applications. It also involves privacy protection

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